

POLICY BRIEF

STEWART

Social, economic and institutional dimensions of Wastewater Reuse in agriculture in Tunisia

STEWART IN A NUTSHELL



FUNDING DAAD, Program Line 2
German-Arab Transformation
Partnership 2019

MAIN OBJECTIVES

- ◆ To better understand social, economic, and institutional factors determining farmers' willingness to reuse TWW.
- ◆ To identify institutional, technical and governance gaps related to TWW and its reuse in agriculture.

PARTNERS

- ◆ University of Kassel, Germany
- ◆ INRGREF, Tunisia

ASSOCIATED PARTNERS

- ◆ ESA Mograne, Tunisia
- ◆ INAT, Tunisia
- ◆ IRESA, Tunisia

STAKEHOLDERS

- ◆ CRDA Nabeul
- ◆ GDA Souhil, Nabeul

AREA OF STUDY

TWW irrigated area of Oued Souhil

DURATION

Apr 2019-Dec 2019

BUDGET: 40,000 EUR

INTRODUCTION

- ◆ In Tunisia, there is a huge need to use alternative water resources for agricultural irrigation. However, more than 80% of the treated wastewater (TWW) is **discharged** in the receiving environment, not without some **negative impacts** on the ecosystem.
- ◆ Crops allowed to be irrigated with TWW are subject to regulatory restrictions which contributes to the **low acceptability** of reuse.
- ◆ The lack of **communication** between the multitude of actors at national, regional, and local levels results in substantial knowledge gaps about opportunities and risks of irrigating with TWW.
- ◆ **Socio-economic** and **institutional factors** are (still) hampering the progress of adopting this practice, resulting in insufficient economic benefits for the farmers and low reuse rates.
- ◆ The reuse of TWW may transfer thousands of **chemical and biological compounds** whose occurrence, fate, behavior, and long-term impacts on health and the environment are not well addressed.

This situation requires a profound empirical analysis for fostering a comprehensive understanding of the institutional, social, and economic contexts and determinants.

OBJECTIVES

- ◆ To investigate the current situation of wastewater reuse in Tunisia and its social, institutional, and economic dimensions.
- ◆ To explore the relationship between stakeholders interacting in the wastewater reuse sector in Tunisia.
- ◆ To identify ways in which quality and quantity of supplied TWW satisfy farmer's needs.
- ◆ To facilitate behavioral change and capacity building that will contribute to enhancing awareness about wastewater reuse in agriculture.
- ◆ To contribute to the development of new research guidelines that will assist in implementing further R&D projects.

POLICY LEARNING WORKSHOP



Expected outcomes

- ◆ Concrete actions to solving operational/technical obstacles for TWW reuse in agriculture.
- ◆ Stimulated learning processes on the role of institutions and governance in coordinating the TWW sector.
- ◆ Established and intensified scientific/academic cooperation on WW treatment and reuse.
- ◆ Extended network between the University of Kassel, University of Carthage, and other MENA universities for long-term cooperation promoting joint research programs.
- ◆ Enhanced and shared teaching and research experiences on institutions and governance of natural resources (e.g. organizing summer and/or winter schools for MSc and PhD students from Germany and MENA countries on the topic "Institutions and Governance of natural resource management").

ACTIVITIES

◆ Kick-off Meeting, 16-19 July 2019, Witzenhausen, Germany

- Introduction of the project partners, discussion of common fields of interest, and preparation of the Policy Learning Workshop (PLW), including the identification of key participants and setting up approaches/methodologies and main activities.
- Meeting with the Dean of the Faculty of Organic Agricultural Sciences and with the Head of the International Office of the University of Kassel to discuss future opportunities for collaboration.

◆ Policy Learning Workshop, 12-15 November 2019, Hammamet, Tunisia

Objectives

- To initiate learning processes for inter- and trans-disciplinary research on TWW reuse in agriculture with researchers and policy makers.
- To establish a first stepping stone for collaboration and exchange of academic experiences focused on agricultural and agri-environmental policies and environmental governance.
- Bringing together water and TWW experts from Germany, Tunisia, and other MENA countries to: i) Develop a comprehensive understanding of challenges for TWW reuse in Oued Souhil and discuss solutions; ii) Improve the understanding of each other's strengths; iii) Identify common interests and strategies for safe TWW reuse; iv) Connect researchers from partner and participating countries to invest in joint research projects; v) Improve curricula, research, and teaching in Tunisia and other MENA countries.

Insights on sessions

Panel Discussion

What is the problem?

- Overlapping responsibilities between TWW stakeholders, lack of communication and exchange of data, and lack of transparency among stakeholders result in poor water governance.
- Lack of common legal framework and policy instruments.
- Low acceptance of TWW due to negative perceptions.

What to do?

- More transparency between producers, TWW administrators, and farmers, including communication of opportunities and risks.
- Common TWW management plan, involving all stakeholders including farmers and water users' association.
- TWW producer need to guaranty a water quality sufficiently safe for food and non-food crops and perhaps different purposes.

POLICY LEARNING WORKSHOP



KEY FEATURES

- ◆ **Panel Discussion:** Experts from Tunisia, Bahrain, and Germany discussed the future of TWW reuse in general, and in Tunisia.
- ◆ **World Café:** Group discussions on social, economic, governance, and institutional aspects of TWW management and reuse.
- ◆ **Field Trip:** Visit to the pilot project under drip irrigation in Oued Souhil (ACCBAT Project).
- ◆ **Role Game:** Discussion on TWW quality and quantity problems from various stakeholder perspectives, based on data collected during the field visit.
- ◆ **Insights from Abroad:** Experiences on TWW reuse from Algeria, Bahrain, Germany, Oman, and Tunisia.

PARTICIPANTS

> 40, including students, technicians, researchers, professionals, and farmers from ANCSEP, ANPE, AVFA, CRDA Nabeul, DHMPE, DGGREE, ESA Mograne, GDA Souhil, INAT, INRGREF, IRESA, ISOE, MWMAUP (Bahrain), ONAS Nabeul, PAUWES (Algeria), SQU (Oman), and University of Kassel.

ACTIVITIES (cont.)

World Café: Emerging Contaminants (EC): Lack of monitoring; high use of chemical compounds at the household level; lack of analysis and studies on EC in soil and plants; concentration of EC related to industry and tourism. **Socio-economics:** Lack of knowledge about benefits of using TWW; low level of acceptance due to health risks; lack of economic incentives due to urbanization and land fragmentation; low water tariffs; scarcity of financial and human resources. **Governance and Institutions:** lack of coordination and communication; lack of human and financial resources; monitoring and control of TWW quality problem; lack of information sharing and overlapping responsibilities; lack of support for innovation; lack of political will on the part of decision makers.

Role-playing Game: is a game where players assume the roles of characters in a fictional setting to give an overview on faced problems and potential solutions based on compromise. In our case, representatives from six different stakeholder groups (policy maker, ONAS, CRDA, GDA, Ministries of Environment & Public Health, consumers) swapped roles and discussed approaches to solve quantity and quality problems of TWW reuse under budget constraints during 2 rounds. Participants agreed on a set of measures:

- Setting up constructed wetlands.
- Improving extension activities and communication.
- Multi-disciplinary/multi-level capacity building.
- Awareness raising and qualification measures.
- Strengthening the control of produce irrigated with TWW.

Insights from Abroad

Algeria: Sensitizing farmers about the benefits of water reuse, building capacities for extension services, setting incentives for investments, and coordinating water-related stakeholders are among the future challenges to optimize water reuse in agriculture.

Bahrain: Partial food security and preservation of scarce water resources and non-renewable groundwater in a small agricultural land can be achieved through water reuse. Proper coordination among water authorities, standards, and enforced regulations are needed.

Germany / EU: City of Braunschweig runs major water reuse scheme in Germany (since 1954) to irrigate industrial crops, for infiltration, and for recreational purposes. EU is discussing regulations for TWW reuse in agriculture; draft standards are based on risk assessment and health protection.

Oman: Initiatives to achieve maximum utilization of TWW in several areas: production of bio-fuel, aquaculture, and aquaponic are new orientations. Priorities of reuse are: agriculture & landscape, urban use, industrial, and groundwater injection.



TAKE HOME MESSAGES



STEWARDSHIP policies should be adopted by the actors of the water sector to fulfil the institutional, economic, and technical needs of waste water reuse in agriculture.

- ◆ **For policy-makers:** Participatory approaches and more horizontal communication with local communities and water users.
- ◆ **For researchers:** Trans-, and interdisciplinary impactful research projects to enhance water governance and reuse.
- ◆ **For stakeholders:** Collaborative, multi-institutional projects, data sharing, coordination of actions.
- ◆ **For farmers:** Economic benefits require health safety and environmental sustainability to be seriously considered.

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Further details

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Photos credit

Olfa Mahjoub

ACTIVITIES (cont.)

Field visit:

Interviews of farmers about the main constraints encountered for O&M of the drip irrigation system. For farmers, the main concerns include:

- Low TWW quality as a barrier to agricultural diversification
- Insufficient TWW quantity mainly during summer season
- Visible contamination of surface well water (color and smell)

Discussion with farmers, operators, and regulators highlighted:

- Unclear distribution of responsibilities (e.g., for cleaning)
- Need for 'new' financial sources to extend the project
- Lack of knowledge on part of the farmers about water-borne diseases and health and environmental risks associated with waste water reuse and about good practices for TWW reuse.

CONCLUSIONS

- ◆ The STEWART project has enabled an intensive exchange of knowledge and experiences between scientists, technicians, administrators, farmers, and policy makers on opportunities and challenges of TWW reuse in agriculture in the Oued Souhil area.
- ◆ Appropriate governance modes need to be more participatory in nature and adequately address the socio-cultural, socio-economic, and political contexts in Tunisia.
- ◆ Optimizing TWW reuse needs to build on sharing everyday and scientific knowledge to address farmers' concerns and problems.
- ◆ Inter- and transdisciplinary research approaches are needed to be promoted to address societal problem in an integrated manner.

THE WAY FORWARD

- ◆ Make of Oued Souhil area an experimental platform where new concepts and innovative tools can be tested and disseminated.
- ◆ Establish a transparent communication structure in the area.
- ◆ Perform a risk assessment related to wastewater reuse based on existing data.
- ◆ Increase capacities of German and Tunisian researchers, teachers, and M.Sc. and PhD students in the field of TWW reuse in agriculture to address new approaches like agro-ecology and extend these activities to other MENA countries.
- ◆ Prepare a joint R&D project on TWW reuse on drip-irrigated plots in the Oued Souhil area, also addressing farmers' problems.